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(54) Automobile transport railway wagon

(57) The automobile transport railway wagon, comprises a frame supported on bogies, at least one turntable (1) pivoting about a vertical shaft (6) supported by the frame, serving to support a passenger automobile in a longitudinal transport position parallel to the longitudinal axis of the wagon, means (13, 14) lateral to the turntable for access to by and unloading therefrom of an automobile, and means for rotating the turntable by an angle of more than 45° to change over from an angular loading or unloading position to one of transport. The top surface of the turntable is level with the floor (2) of the wagon body, the turntable has a generally circular shape, minus at least one segment, such that its width when in transport position is slightly less than that of the wagon, and the turntable's automobile carrying surface has at least one unoccupied side surface (12) available for pedestrian traffic.

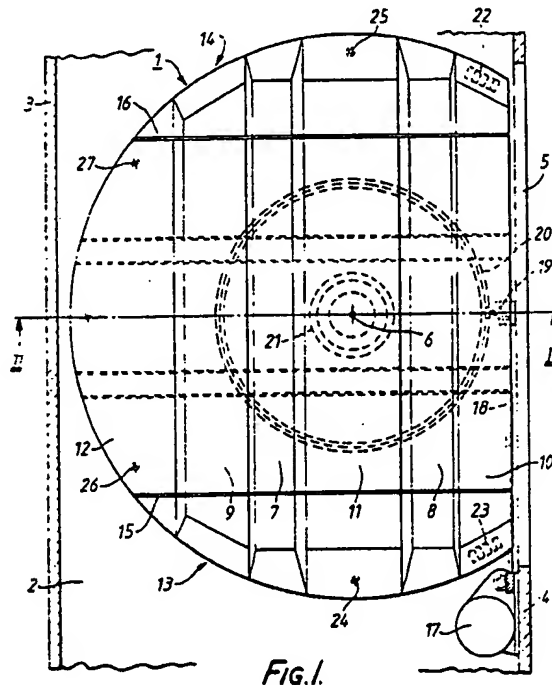


Fig. 1.

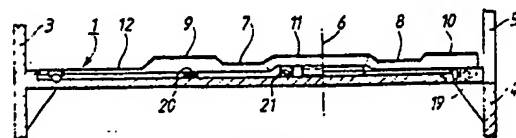


Fig. 2.



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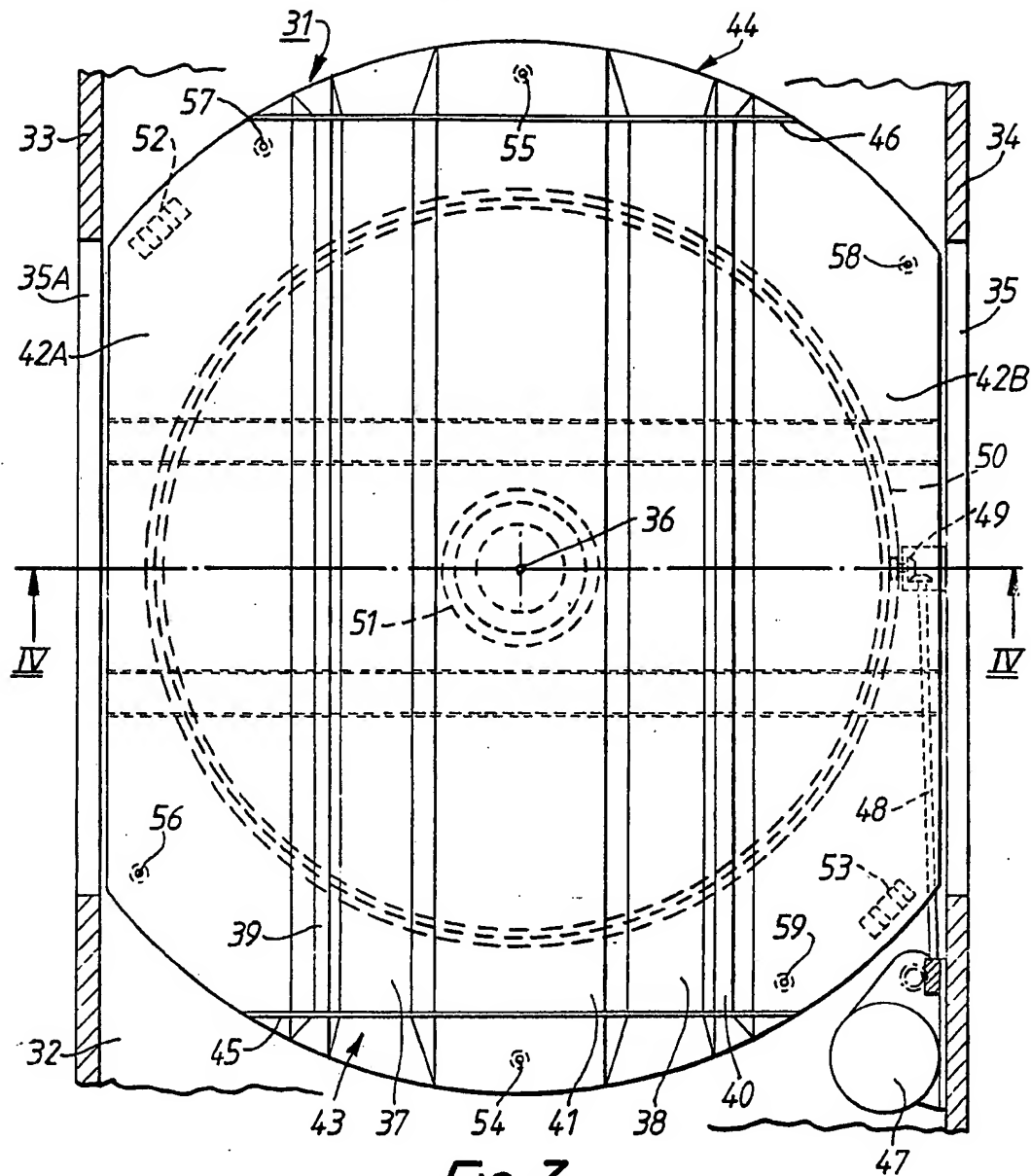


FIG. 3.

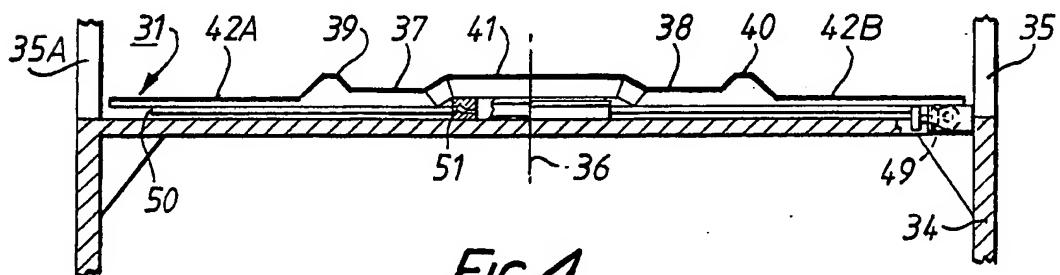
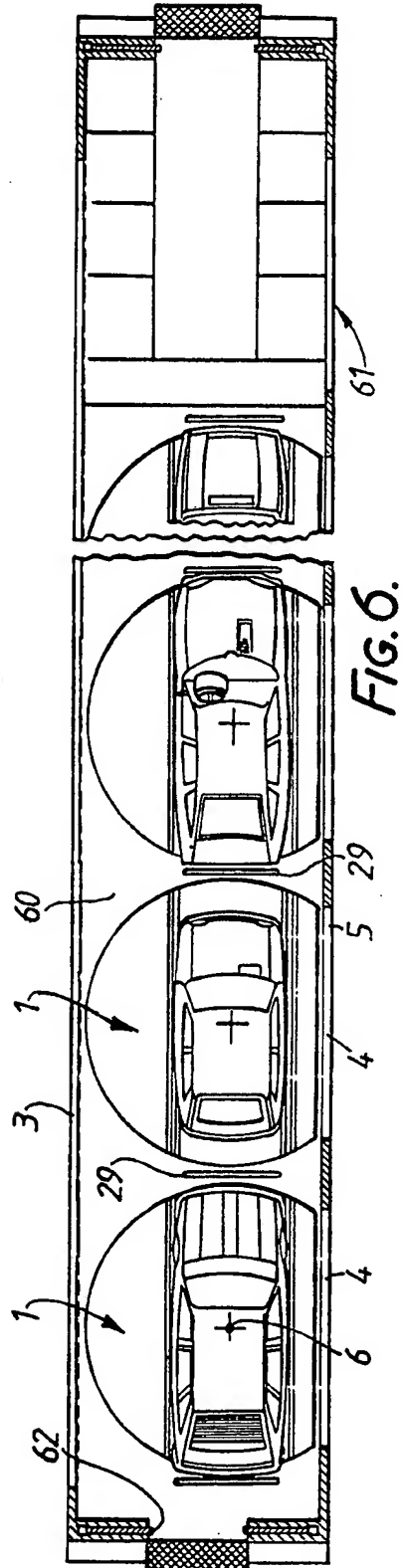
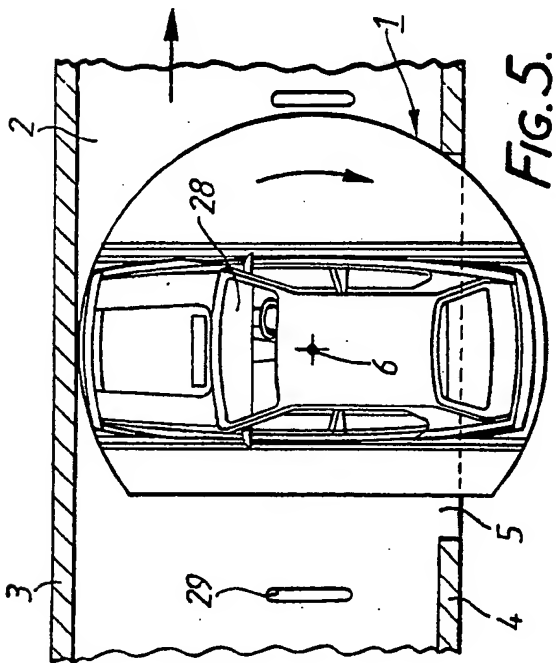
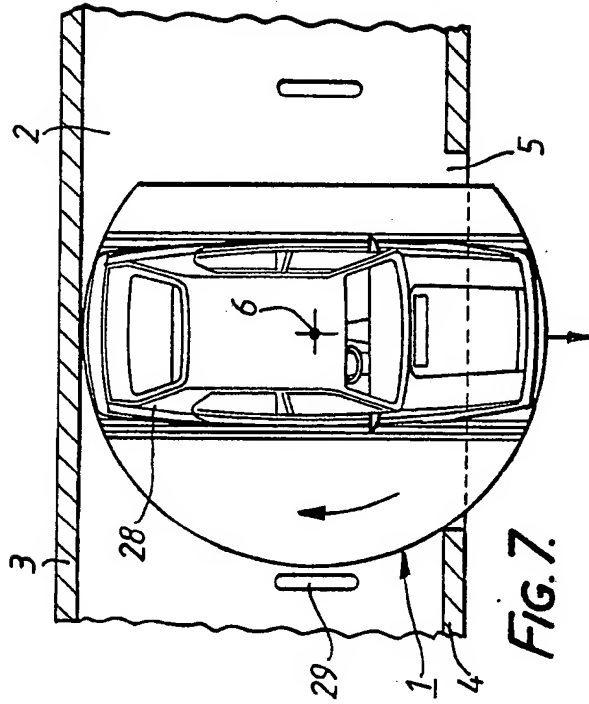


FIG. 4.

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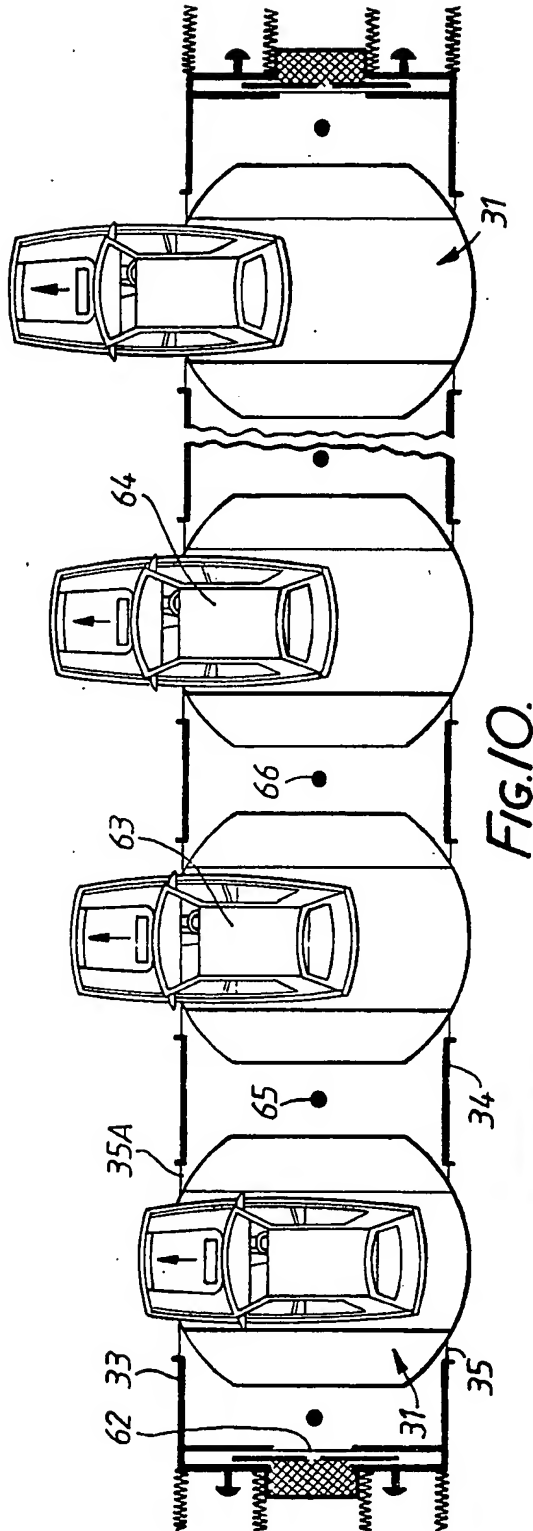


FIG. 10.

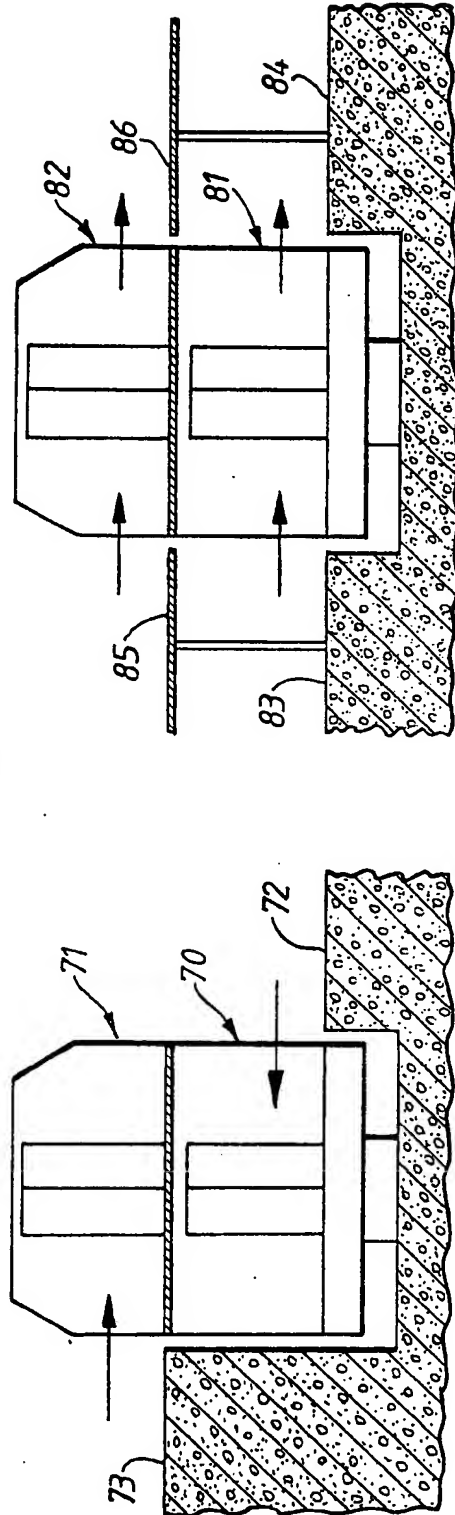


FIG. 12.

FIG. 11.

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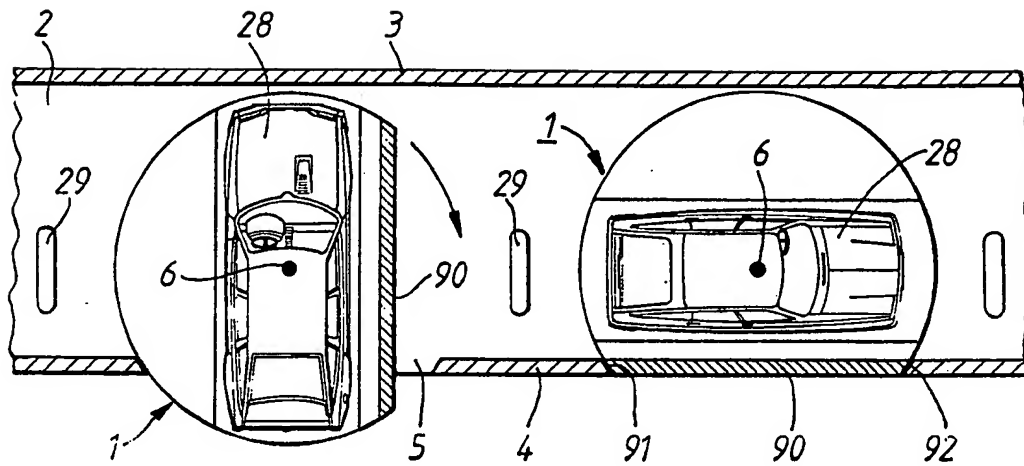


FIG. 13.

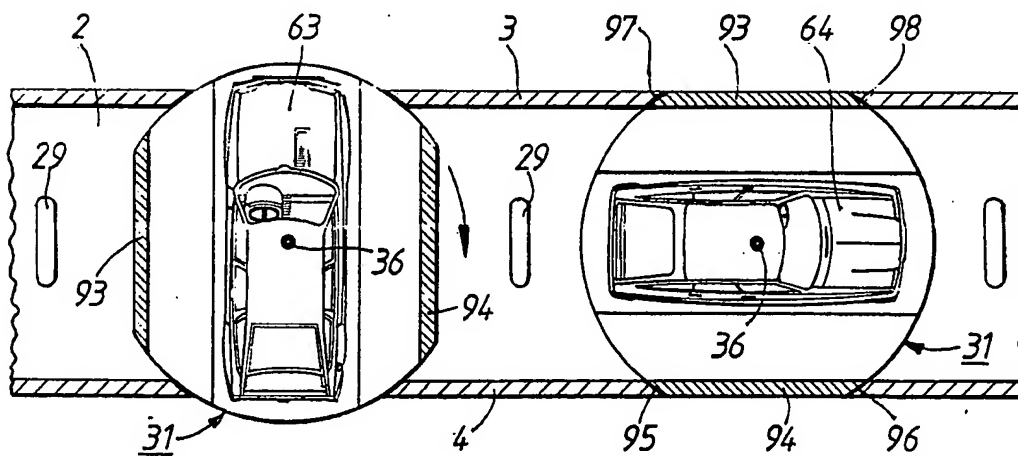


FIG. 14.

Automobile Transport Railway Wagon

This invention concerns an automobile transport railway wagon, comprising a frame supported on bogies, at least one rotary platform, or turntable, pivoting about a vertical shaft supported by the frame, serving
5 to support a passenger automobile in a longitudinal transport position parallel to the longitudinal axis of the wagon, means of access to and unloading the automobile from the rotary platform, on the sides thereof, and means for rotating the platform by an angle of more than 45° to change over from an angular loading or unloading position to one of transport.

10 Document US-A-2782733 has already proposed an automotive transport railway wagon comprising a frame supported at each end by a bogie, and having a centre platform rotatable about a vertical shaft disposed in the wagon's longitudinal axis at a level much lower than that of the two ends of the wagon, consisting of two straight trackways each
15 approximately as wide as the tyres of the vehicle to be transported and slightly longer than the maximum length of the running gear of said vehicle, supported at their ends on rollers cooperating with a circular guideway of a diameter greater than the width of the wagon, the parts thereof exceeding said width being however operable to be folded
20 downwards. Access ramps which are likewise down-foldable and approximately as wide as the tyres of the vehicle are provided at the ends of the straight trackways, forming vehicle loading and unloading ramps.

For loading, the platform is manually pivoted until the trackways are perpendicular to the axis of the wagon; the lengths of the circular
25 guideway exceeding the width of the wagon are dropped into horizontal position and supported on blocks; then the access ramps are dropped into horizontal position. The vehicle is moved onto the straight trackways via the access ramps and thereafter the platform is rotated until the straight trackways are parallel to the axis of the wagon, the access ramps are
30 raised; then the parts of the circular guideway which exceed the width of the wagon are raised. The same steps are followed in reverse to unload.

Such a loading/unloading system requires a certain number of manual operations at each loading and unloading, making both procedures relatively slow. Also, the wagon cannot be loaded on two levels. Nor does

it allow the passengers of the automobile to alight and move about within the train formed by the wagons to reach leisure or entertainment areas.

A road vehicle transport train is also proposed in Document US-A-3584584, comprising wagons with two superposed platforms pivotable to
5 a limited angle, not exceeding 30°, about a vertical shaft located in the longitudinal axis of the wagon, loadable and unloadable through the ends of each wagon, from or to stationary access ramps arranged obliquely in relation to the axis of the train. Walkways are provided alongside the automobile storage sections. Between consecutive wagons auxiliary
10 bodies are provided, the top part whereof may comprise a load-carrying deck for a single automotive vehicle, also rotatable about a shaft in the longitudinal axis of the wagon, to an angle not exceeding 30°. Such a train entails long loading and unloading times, since the wagons themselves are loaded and unloaded via their ends, one vehicle at a time. Moreover, each
15 transfer operation requires very accurate positioning of the train for exact registration or alignment of the wagon ends and those of the auxiliary bodies with the access ramps.

The present invention is directed to providing an automobile transport railway wagon enabling very quick loading and unloading of
20 vehicles, whereby a plurality of automobiles may simultaneously enter or simultaneously leave the wagon without the need for precise positioning of the wagons in relation to the station platforms. It is another object of the invention to allow for automobile passengers to leave their vehicles during the trip, to move about in the train and to reach rest and relaxation areas.

25 The automobile transport railway wagon according to the invention features an automobile carrying platform, hereinafter termed turntable, the top surface whereof is level with a wagon body floor, said turntable having a substantially circular shape, minus at least one segment, such that its width in transport position is only slightly smaller
30 than that of the wagon, and the automobile bearing surface thereof leaves available at least one side surface for pedestrian traffic.

The inventive wagon further preferably has at least one of the following features:

5 - The vertical pivot shaft for the turntable is arranged laterally with respect to the wagon's longitudinal plane of symmetry; the turntable's general form is circular, minus a single segment, and its surface opposite the missing segment is unoccupied, to allow pedestrian traffic.

 - The vertical pivot shaft for the turntable is arranged in the wagon's longitudinal plane of symmetry; the turntable's general form is circular, minus two diametrically opposite segments and it comprises two unoccupied lateral surfaces for pedestrian traffic.

10 - At least one folding or sliding door is provided on each side of each turntable for passenger entrance or exit.

 - The turntable comprises two hinged segments having an axis of symmetry perpendicular to that of the one or more missing segments, forming, when in transfer position, accesses to the turntable from the
15 station platform.

 - In addition to the one or more turntables, the wagon comprises at least one utility and/or rest and relaxation area for the passengers.

 - The turntable further comprises at least one vertical panel operable, when in longitudinal transport position, to close an entry or exit
20 door. This feature allows one to eliminate individual door opening and closing operations and consequently further speeds loading and unloading.

 - If the vertical pivot shaft is arranged laterally with respect to the wagon's longitudinal plane of symmetry, the turntable has only one vertical panel to close the corresponding entrance and exit when in
25 longitudinal transport position.

 - If the vertical pivot shaft is arranged in the wagon's longitudinal plane of symmetry, the turntable has a vertical panel on each side to close each respective entrance or exit when in the longitudinal transport position.

30 There will now be described, by way of example and with reference to the appended schematic drawings, automobile loading and unloading turntables in an automobile transport railway wagon and transport wagons equipped with such turntables.

Figure 1 of the drawings gives a plan view of an automobile carrying turntable having an eccentric pivot shaft, arranged laterally with respect to the wagon's longitudinal plane of symmetry.

Figure 2 shows the same turntable in cross section along II-II of Figure 1.

Figure 3 shows a plan view of a similar turntable, having its pivot shaft arranged in the wagon's longitudinal plane of symmetry.

Figure 4 shows the turntable of Figure 3 in cross section along line IV-IV of that figure.

Figure 5 represents an automobile in the process of being loaded onto an eccentric turntable.

Figure 6 represents an automobile transport wagon loaded with automobiles, during transport.

Figure 7 represents the automobile of Figure 5 being unloaded.

Figure 8 represents several automobiles being loaded into a wagon with turntables whose pivot shafts are arranged in the wagon's longitudinal plane of symmetry.

Figure 9 represents the same automobiles during transport in a wagon.

Figure 10 shows the same automobiles again, being unloaded.

Figure 11 is a cross sectional diagram of a double-deck wagon at a station, operable to be loaded and unloaded from the same side.

Figure 12 is a cross sectional diagram of a double-deck wagon at a station, operable to be loaded and unloaded from opposite sides.

Figure 13 is a diagram of a section of an automobile transport wagon with turntable pivot shafts offset from the wagon's longitudinal plane of symmetry, one of the turntables being represented in loading/unloading position and another being represented in transport position.

Figure 14 is a diagram of a section of an automobile transport wagon with turntable pivot shafts in the wagon's longitudinal plane of symmetry, one of the turntables being represented in loading/unloading position and another being represented in transport position.

In Figures 1 and 2, the turntable 1 is arranged on the floor 2 of wagon body. The wagon may have one or two floors, ie. be double-decked. The wagon has side walls 3 and 4 and has a doorway 5 in front of the turntable, which doorway can be closed off by a vertically folding or sliding door, such as a garage door, not shown. The turntable is pivotable about the vertical shaft 6, which is offset from the wagon's longitudinal plane of symmetry.

The turntable features longitudinal trackways 7 and 8 bounded by lateral raised portions 9 and 10 and a centre raised portion 11 to accommodate the wheels of an automobile. To the left of raised portion 9 in the drawing, a flat surface 12 forms a floor for a walkway, allowing passengers to alight from their vehicles and walk to rest and relaxation areas, toilets, or catering areas and the like in the train.

The turntable has two diametrically opposite segments at right angles to the missing segment. These two segments can swivel on hinges 15 and 16 from the position shown in these figures, when the turntable is rotated 90°, to form a loading or unloading platform. Ramps 22 and 23 (consisting of rollers or of a low-friction material) are provided to guide the segments back to horizontal position as they rotate back into the wagon.

The turntable is rotatively driven by a geared motor 17, a transmission shaft 18, a bevel gear box 19 and a toothed wheel 20 attached to the turntable, which is supported on a ball ring 21. A set of thrust ball bearings 24, 25, 26, 27 ensure that the turntable rotates parallel to the floor of the wagon.

Turntable 31 shown in Figures 3 and 4 is symmetrical with respect to wagon's longitudinal plane of symmetry, in which its vertical pivot shaft 36 is located. The wagon body comprises the floor 32 and side walls 33 and 34. The latter are provided with openings 35 and 35a, which can be closed by vertically folding or sliding doors which have again been omitted from the drawing. The turntable includes longitudinal trackways 37, 38 to receive the wheels of an automobile, which trackways are bounded by raised side portions 39 and 40 and a raised centre portion 41.

Flat surfaces 42A and 42B on the outsides of the raised side portions form floors for pedestrian passageways.

The turntable features two diametrically opposite segments 43 and 44 movable about hinges 45 and 46 and operable, when the turntable is
5 rotated 90° from the position shown, to form loading and unloading platforms. Ramps 52 and 53 serve to guide the segments back to horizontal position as they rotate back into the wagon. A set of thrust ball bearings 55, 56, 57, 58, 59 ensure that the turntable remains parallel to the floor of the wagon while rotating.

10 Turntable rotation is obtained in the same way as for the turntable of Figures 1 and 2, by means of a geared motor 47, a transmission shaft 48, a bevel gear box 49, a toothed wheel 50 and a ball ring.51.

Figure 5 illustrates the loading of an automobile into a wagon
15 equipped with a turntable as described in Figures 1 and 2.

The automobile 28 arrives perpendicular to the longitudinal axis of the wagon, as illustrated (or at another angle not more than approximately 30° more than perpendicular) and advances nearly to the opposite wall 3 of the wagon. The turntable is then rotated 90° clockwise,
20 or anti-clockwise, as the case may be (or by any required angle so that the automobile will be parallel to the axis of the wagon).

Once the several automobiles have been loaded, they are disposed in the wagon as shown in Figure 6. The autos leave a wide side corridor 60 unobstructed, for pedestrian traffic, allowing passengers to reach a rest
25 and relaxation area 61. Sliding doors 62 allow passage from one railway car to the next. Crash stops 29 prevent possible impacts between automobiles in the event of one having been inadequately braked.

The unloading of an automobile from the wagon is illustrated in Figure 7. The turntable is again rotated 90° clockwise, or anti-clockwise
30 as the case may be (or by a slightly greater or lesser angle), such that the front of the automobile faces the station platform. The several automobiles aboard the wagon can therefore all leave simultaneously and quickly.

The loading procedure for a wagon equipped with turntables disposed symmetrically with respect to its longitudinal centre line, such as represented in Figures 3 and 4, is illustrated in Figure 8. The autos, such as denoted by numerals 63 and 64, arrive in perpendicular relation to the wagon's longitudinal axis (or at an angle no more than approximately 30° greater than the perpendicular). They move onto the turntable and stop when they are fully supported by the latter.

Once all the automobiles have been so engaged, the turntables are rotated 90° clockwise (as shown in the figure) or anti-clockwise (or by any other angular amount required to align all the automobiles with the wagon's longitudinal axis). This results in the transport arrangement illustrated in Figure 9, which leaves open for passengers two corridors, one on each side of the automobiles. The turntables are separated from one another by crash stops or posts 65, 66.

At unloading (Figure 10), the turntables are rotated 90° (or by some other slightly smaller or greater angle) in the opposite direction from the direction of turntable rotation at loading. The automobiles thus have their fronts facing the station platform, on the opposite side from the loading station platform. They can thus leave the wagon simultaneously and quickly.

Figure 11 very schematically shows the loading procedure for a double-decked wagon with decks 70, 71 equipped with turntables like those shown in Figures 1 and 2. In this configuration, loading and unloading both take place from the same side for a given deck or level and accordingly can be carried out simultaneously for both decks or levels, in cooperation with two station platforms 72, 73 built to a height to match the levels of the two wagon decks.

In Figure 12, the double-decked 81, 82 wagon is equipped with turntables according to Figures 3 and 4, providing for loading and unloading from opposite sides.

The station platforms on each side of the wagon thus each consist of two levels, 83 and 85 and 84 and 86 respectively.

In Figure 13 the turntable 1 has a pivot shaft 6 offset from the wagon's longitudinal plane of symmetry, said wagon comprising a floor 2

and side walls 3 and 4, the latter having entrance and exit openings therein, such as 5. This opening does not have a fold-down or sliding door. Instead the turntable features a vertical side panel 90 which, when in transport position, closes opening 5 as shown in the right-hand portion of the figure. To ensure good sealing, the edge (91, 96 in the figure) of the sidewall opening 5 which faces that of the turntable side panel 90 when the wagon is in transport configuration is preferably provided with inflatable seals of a known type. The turntables are separated by crash stops 29 to prevent possible collisions between automobiles when in transport position.

In Figure 14, the turntable 31 carrying automobiles 63, 64, with centre at 36, is symmetrical about the wagon's longitudinal plane of symmetry. It has a vertical panel 93, 94 on each side to seal the openings in the wagon sides 3 and 4 in transport configuration. Sealing is provided during transport by means of inflatable seals fitted along the edges 95, 96, 97 and 98 of the entrance and exit openings.

The vertical panel, which does not interfere with loading and unloading operations, or with pedestrian traffic, during transport, thus automatically closes or opens the entrance and exit doorways, as the turntable rotates for train departure or arrival. In fact, this disposition precludes the possibility of forgetting or neglecting any aspect of door closure at the time of departure.

CLAIMS:

- 1) An automobile transport railway wagon, comprising a frame supported on bogies, at least one turntable pivoting about a vertical shaft supported by the frame, serving to support an automobile in a longitudinal transport position parallel to the longitudinal axis of the wagon, means of access to and unloading the automobile from the turntable, on the sides thereof, and means for rotating the turntable by an angle of more than 45° to change over from an angular loading or unloading position to one of transport, wherein the top surface of the turntable is on a level with the floor of the wagon body, the turntable has a generally circular shape, minus at least one segment, such that its width when in transport position is slightly less than that of the wagon, and the turntable's automobile carrying surface has at least one unoccupied side surface available for pedestrian traffic.
- 2) A wagon according to Claim 1, wherein the vertical pivot shaft for the turntable is arranged laterally with respect to the wagon's longitudinal plane of symmetry, wherein the turntable's general form is circular, minus a single segment, and wherein the turntable's surface opposite the missing segment is unoccupied, to allow pedestrian traffic.
- 3) A wagon according to Claim 1, wherein the vertical pivot shaft for the turntable is arranged in the wagon's longitudinal plane of symmetry, the turntable's general form is circular, minus two diametrically opposite segments, and the turntable comprises two unoccupied lateral surfaces for pedestrian traffic.
- 4) A wagon according to any of Claims 1, 2 and 3, wherein at least one folding or sliding door is provided on each side of each turntable for passenger entrance or exit.
- 5) A wagon according to Claim 3 or Claim 4, wherein the turntable comprises two hinged segments having an axis of symmetry perpendicular to that of the one or two missing segments, forming, when in automobile loading or unloading position, accesses to the turntable from the station platform.

- 6) Wagon according to any of the Claims 1 through 5, further comprising, in addition to the one or more turntables, at least one utility and/or rest and relaxation area for the passengers.
- 7) Wagon according to any of the Claims 1 through 6, wherein the
5 turntable further comprises at least one vertical panel operable, when in longitudinal transport position, to close an entry or exit door.
- 8) Wagon according to Claim 7 having a turntable or turntables the vertical pivot shaft whereof is arranged laterally with respect to the wagon's longitudinal plane of symmetry, wherein each turntable has only
10 one vertical panel to close the corresponding entrance and exit when in longitudinal transport position.
- 9) Wagon according to Claim 7 having a turntable or turntables the vertical pivot shaft whereof is arranged in the wagon's longitudinal plane of symmetry, wherein each turntable has a vertical panel on each side to
15 close an entrance or exit when in the longitudinal transport position.
- 10) An automobile transport railway wagon substantially as hereinbefore described with reference to Figures 1, 2, 5 - 7 and 13; Figures 3, 4, 8 - 10 and 14; Figure 11 or Figure 12 of the accompanying drawings.